

I Claim:

1. A hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus providing rotation of the housing in a predetermined rotation range, wherein the hinge apparatus comprises:
  - a fixing bracket secured to the main body;
  - a hinge unit secured to the housing, and connected to the fixing bracket to be reciprocatingly rotatable within a predetermined angle;
  - a shaft member for rotatably connecting the hinge unit and the fixing bracket so that the hinge unit and the fixing bracket can rotate with respect to each other; and
  - a sensing unit disposed on at least one of the hinge unit and the fixing bracket to sense the relative rotational range of the hinge unit with respect to the fixing bracket.
2. The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 1, wherein the fixing bracket comprises:
  - a body having a first surface;
  - a first locking protrusion protruding from the first surface of the body for restricting the rotational movement of the hinge unit when the first locking protrusion is rotated with respect to the hinge unit.
3. The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 1, wherein the fixing bracket further comprises:
  - a first rib protruding from the first surface at a radial distance different from that at which the first locking protrusion protrudes; and
  - a second rib protruding from the first rib, wherein said first and second rib being arranged to couple said fixing bracket to said hinge unit.

4. The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 1, wherein the fixing bracket further comprises:

5 a shaft hole for receiving the shaft member for rotatably connecting the hinge unit and the fixing bracket so that the hinge unit and the fixing bracket can rotate with respect to each other.

5. The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 1, wherein the fixing bracket further comprises:

a pair of sensing holes for detection by the sensing unit to enable the sensing unit to sense the relative rotational range of the hinge unit with respect to the fixing bracket.

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6. The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 5, wherein the pair of sensing holes are formed at predetermined distances from each other, and at a predetermined distance from the first axis.

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7. The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 2, wherein the first locking protrusion is provided at an outer position of the first surface of the body, and is formed at approximately 45° with respect to a first axis direction through the center of the hinge apparatus.

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8. The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 1, wherein the hinge unit comprises:

30 a hinge bracket fixed onto the housing;

a contact plate connected with the hinge bracket; and  
a plate spring disposed between the hinge bracket and the contact plate  
for urging the contact plate toward the fixing bracket.

5           9.       The hinge apparatus for rotatably connecting a housing with  
respect to a main body of an image photographing apparatus according to  
claim 8, wherein the hinge bracket comprises:

a body, comprising a first surface, a shaft hole for receiving the shaft  
member and an annular rib protruding from the first surface.

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10.       The hinge apparatus for rotatably connecting a housing with  
respect to a main body of an image photographing apparatus according to  
claim 9, wherein the annular rib comprises:

15           a cam surface, with a variable height, provided to an upper end of the  
annular rib along the circumference of the annular rib, for detecting a  
movement range of the fixing bracket that rotates.

20           11.       The hinge apparatus for rotatably connecting a housing with  
respect to a main body of an image photographing apparatus according to  
claim 10, wherein the cam surface comprises:

an operating surface formed by a first predetermined length at the  
substantially the same height as the annular rib, wherein the operating surface  
faces the second rib of the fixing bracket in contact therewith;

25           a non-contact surface formed on a lower plane than the operating  
surface with a second predetermined length; and

an inclined surface connecting the operating surface and the non-  
contact surface.

12. The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 1, wherein the sensing unit comprises:  
a substantially elastic piece;  
5 a pair of cam pins disposed on both ends of the elastic piece for sensing the relative rotational range of the hinge unit with respect to the fixing bracket; and  
a pair of switches provided to the positions corresponding to the cam pins for providing a signal indicating an operating mode of the image  
10 photographing apparatus.

13. The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 12, wherein the elastic piece includes metal.

14. The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 12, wherein the cam pins are positioned to protrude through sensing holes disposed in the fixing bracket.

15. The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 1, further comprising:

a click force providing unit disposed between the fixing bracket and  
25 the contact plate for providing a predetermined indication at predetermined intervals during the rotation of the housing with respect to the body.

16. The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to  
30 claim 15, wherein the click force providing unit comprises:

a click plate connected to the fixing bracket; and  
at least one click ball arranged between the click plate and the contact plate for providing the predetermined indication.

5           17.     The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 16, wherein the click plate further comprises:  
a plurality of click balls.

10           18.     The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 16, wherein the click plate includes metal.

15           19.     The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 16, wherein the click plate further comprises:  
a plurality of click holes formed at predetermined angles with respect to the first axis.

20           20.     The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 19, wherein the predetermined angles are arranged in intervals of approximately 45°.

25           21.     The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 16, wherein the click plate further comprises:  
a guide groove for guiding the click balls to roll between the click holes.

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22. The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 1, further comprising:

a pair of sensor holes disposed within the fixing bracket;

5 a cam surface comprising an operating surface, a non-contact surface and an inclined surface, the cam surface located on the hinge unit; and

an elastic piece comprising a pair of cam pins disposed to protrude through the pair of sensor holes, and a pair of switches disposed to contact the pair of cam pins;

10 wherein as the cam pins protrude through the sensing holes, the cam pins are pushed backwards by contact with the operating surface to contact one of the pair of switches due to the operating surface being formed of a third predetermined length in consideration of the interval between the cam pins such that only one of the cam pins can be contacted by the operating surface,  
15 and an operating mode of the image photographing apparatus is determined by which cam pin contacts the operating surface and is pushed back to contact one of the pair of switches.

23. The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 1, wherein:

the image photographing apparatus comprises a first camera unit and a second camera unit; and

25 the fixing bracket, the hinge unit, and the shaft member for allowing rotational movement between the first and second camera unit.

24. The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 23, wherein the first camera unit is a digital still camera, and the second  
30 camera unit is a digital video camera.

25. The hinge apparatus for rotatably connecting a housing with respect to a main body of an image photographing apparatus according to claim 23, wherein the sensing unit determines one of a first operating mode that  
5 indicates a digital still camera mode, and a second operating mode that indicates a digital video camera mode.